As Moore’s law about the increase of the complexity of computer components is still active, even considering the fact, that more than 50 years have passed since its publication, it’s can be easily said that processing cost keeps getting cheaper. The impact of continuous improvement causes all the sectors of human activity including economics to depend on processing devices stronger and stronger.

It is a surprise for no-one that more complex and diverse ways to classify and process data, opened by wider spread of complex processing systems, changed ways all the social sciences work: it’s easier to get a hint of the “Bigger picture” using extended volumes of more diverse data. The extension of amounts is caused by the growing availability and decreasing price of systems with increased computation capabilities.

Justin Wolfers and Betsey Stevenson in their work mentioned that now an economic student with a laptop can in few seconds process an amount data comparable to a roomful of Ph.D. few years ago. I hope, it shows how impactful information age breakthrough was. But even on the earliest edges of its development, when the first of the computers were in the search for the position they already cased impact on the researchers. For reference, Daniel Suit in 1962 wrote that IBM 1620 is capable of processing models without size limitation with only the availability of data as its upper limit and Charles Wolf and John Enns called computers a bridge between “formal theory” and “databases”. This way, data processing has no need in as much human control as it used to. The change allows economists to concentrate on more interesting and important matters instead of manual calculations.

In contradiction to practical usages, the impact of automated computing systems on theoretical science is now even comparable to their practical usefulness. Even if, similarly to the natural sciences it’s able to convert a theory into applied work, this type of impact on the economics was rather insignificant until recent years.

But let’s state it in a clear way: What do modern computers offer for the economics scientists and how do they improve the scientific process?

First of all, the time calculations take is drastically lower in comparison with all the methods that came before it (like routine calculators or even pencil and paper). The simplest use case possible is to use processing systems as an reliable tool for solving sets of input-output models, estimation of regression coefficients and process simulation. this type of usage doesn’t change much in terms of theory but makes the time-efficiency of calculation considerably better. But, it’s clear it isn’t the only type of help they are able to organize. As an example, I want to mention work on correlation published in 1949 by statisticians Donald Cochrane and Guy Orcutt. The amount of calculations it contained would be impossible to process in one human lifetime if it was being done using routine calculator (I’m not even mentioning even older methods (like paper and pencil), as they are even slower). I hope the example is a clear demonstration of new possibilities and computation methods opened before the economists even at the start of computerization process.

As the development continues we can get even more impactful assistance. In my opinion, the most important possibility the process of integrating computer systems in scientific process opened is the amount of data being stored. According to the Relx Group’s research we can store up to 677 973 pages of text data in just 1 gigabyte of memory. It’s easy to compare size of simple portable flash drive taking inconsiderable amounts of space (I am not even talking about hard drives) and the amount of paper it replaces.

Additionally, I want to mention computer simulations as one more useful tool modern economists are given. It allow generation of new typical evidential data based on the results of real data research in order to discover new possibilities and improve data classification systems to increase amount and diversity of data used.

Now, there are large databanks available for both academic and commercial use. It has changed econometric software: various markets are now computerized, so its price and usage information is being processed in real time and recorded. The data set has grown big enough to not be able to be studied by traditional means. This cased new empirical tools, such as machine learning, to find their usage in economics, as well.

They allow more realistic simulations to be implemented and, as the result, make theoretical models simpler and more accurate. Because of the change scientists can shift their focus from methodology of the process to its results.

An Automated Reasoning Assistant developed in Argonne National Laboratory, Illinoi, in 1980s is capable of proving mathematical theorems alongside human mathematicians. But only recently this idea was applied to the economic research. As result it had not only proven all know theorems (e.g. Tang and Lin 2009, Kerber, Rowat and Windsteiger, 2011) but did discover new ones (e.g. Tang and Lin 2011; Geist and Endriss 2011; see also Chatterjee and Sen 2014).

It’s a known fact, that AlphaGo has beaten Lee Sedol (dan-9) in Go game this March. Now it can be clearly said that there are no human-created table game in the world where a human cannot be beaten by a computer.

This two examples are used to illustrate how automated computing systems are surpassing humans in all the fields possible. The question is how long will it take to fully replace human-scientists. Well, I think it is easier to do in natural sciences, but social ones (including economics) would take more time. But it is just a question of the delay. It will happen eventually.

So, it’s time to draw the conclusion. Economics is being changed by computers. Considerably so. The process started at the early days of computer development and continues to transform the science, as we know it. I don’t think anyone can predict when will the next breakthrough happen or how will the economics look like after it but the fact that it will is inevitable.

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